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REMOVAL SITE EVALUATION WATER TREATMENT REPLACEMENT (SLUDGE MANAGEMENT) PORJECT OCTOBER 1991

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RSE

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REMOVAL SITE EVALUATION

WATER TREATMENT REPLACEMENT (SLUDGE MANAGEMENT) PROJECT

PA # 20-91202

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

U. S. DEPARTMENT OF ENERGY

OCTOBER 1991

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INTRODUCTION

The present water treatment system at the FEMP utilizes lime and alum to adjust water hardness (dissolved minerals) content to within acceptable limits. This process produces 1.2 yds^3/day (≈ 1 ton) of lime-alum sludge. Currently, the lime-alum sludge is disposed of in the North Lime Sludge Pond. Projections indicate that at the current sludge disposal rate full capacity at the North Pond may be exceeded within six months. In this case, full capacity is defined to include sludge volume, as much as 600,000 gallons (Operable Unit 2 RI/FS estimate) of standing water, and allowances for freeboard.

To prevent pond overflow and reduce the amount of waste material created, a new water treatment process will be implemented to eliminate the generation of the lime-alum sludge. The lime-alum water treatment system will be replaced with a trailer-mounted electrodialysis reversal (EDR) system. This membrane filtration technology produces a brine reject that may be discharged directly to surface water. No unacceptable impact on NPDES discharge limits is expected to result from operation of the EDR.

Construction activities associated with this project will involve the excavation of less than one cubic yard of soil for the placement of concrete piers. The piers will support above-ground utilities required to power the EDR unit and also to supply influent and effluent process water.

Analytical results of soil samples conducted within the EDR work area indicate radiological and chemical concentrations at levels below regulatory concern (see Attachment I). Historical records and process knowledge of the work area do not reveal any known prior use of the project area.

This Removal Site Evaluation (RSE) has been completed for review by the DOE under authorities delegated by Executive Order 12580 under Section 104 of CERCLA. RSE development was consistent with Section 300.410 of the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) to determine if conditions at the North Lime Sludge Pond warrant the implementation of a CERCLA Removal Action.

SOURCE TERM

The North Lime Sludge Pond has been designated as a Hazardous Waste Management Unit for two reasons. First, based on analytical results obtained as part of the Weston Characterization Investigation Study, chlordane ($C_{10}H_6Cl_8$) was discovered at 1.2 ppm. This level is 40 times the TCLP limit of .03 ppm for chlordane. Secondly, through process knowledge, it is believed that 1,1,1 - Trichloroethane (TCA) may have been inadvertently introduced into the Liquid Waste Flow System and eventually found its way to both the North and South Lime Sludge Ponds.

The North Lime Sludge Pond has been in operation since 1984 (sludge was discharged to Waste Pits 3 and 5 from 1964 to 1984). The pond is unlined and located in the southeastern corner of the Waste Storage area. It is approximately 200 feet long by 100 feet wide by 8 feet deep. Total sludge volume has been estimated at 5000 cubic yards. As indicated in the Introduction, the pond may contain as much as 600,000 gallons of standing water. Actual water volumes at any time may vary as a function of precipitation and actual operating conditions. Significant sludge disposal at the South Pond was discontinued in 1964 as storage capacity was reached.

EVALUATION OF THE MAGNITUDE OF THE POTENTIAL THREAT

Because of the pond's Hazardous Waste Management Unit status, continued use of the North Pond to de-water and store lime sludge exacerbates two problems:

1. Clean, non-hazardous lime sludge when deposited in the pond must thereafter be treated as hazardous waste along with the remainder of the pond contents.

2. The probability exists that additions of sludge into the pond act to further disburse hazardous constituents beyond the pond's limits into surrounding soil and ground water.

ASSESSMENT OF THE NEED FOR REMOVAL ACTION

Consistent with the NCP 40 CFR 300.415, the lead agency (DOE) shall determine the appropriateness of a removal action. The factors to be considered in this determination are listed in the NCP, 40 CFR 300.415 (b) (2). Of these factors, the following have been determined to be specifically applicable to this project:

(i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;

(ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems;

(iv) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate; (The presence of hazardous substances in the North Pond is based upon process knowledge and Weston CIS analytical results. RI/FS analytical results have yet to be evaluated in order to verify the previous information.)

(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released.

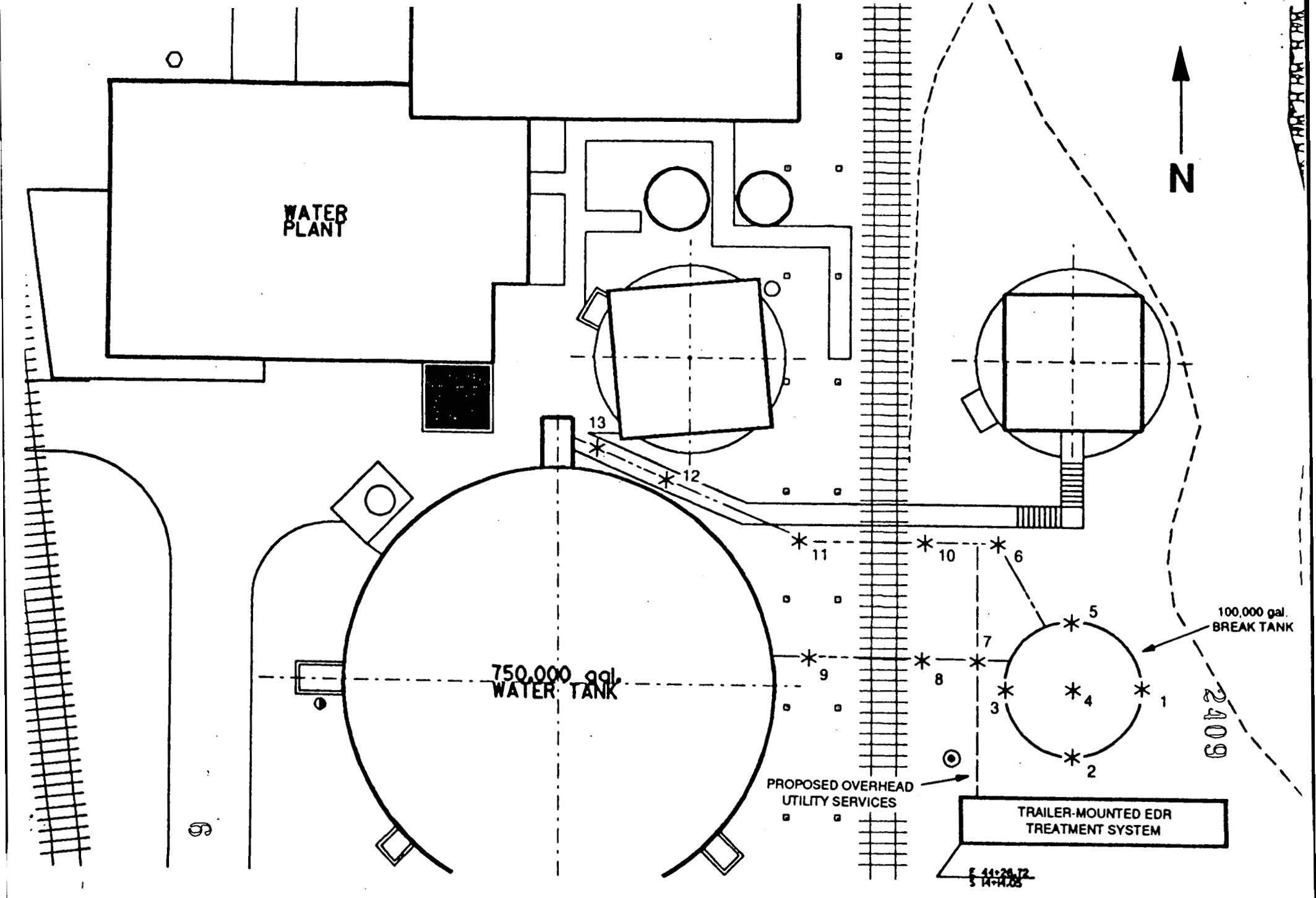
These factors are considered appropriate due to the potential of a release to the environment, if storage capacity at the North Lime Sludge Pond is exceeded.

APPROPRIATENESS OF A RESPONSE

The installation of an EDR system as a CERCLA Removal Action will eliminate lime-alum sludge generation, and is consistent with the principle of waste minimization. Also eliminated is the risk to the environment if a release from the North Pond were to occur, due to insufficient storage capacity. Finally, elimination of sludge generation provides a significant cost avoidance by discontinuing disposal of additional material volume into sludge ponds that may eventually require remediation under CERCLA.

If it is determined that a removal action is appropriate, DOE will issue an Action Memorandum describing the selected response, and indicating whether the removal action is of a time-critical nature.

ATTACHMENT I



WATER TREATMENT REPLACEMENT PROJECT

* SAMPLE LOCATIONS

TABLE 1

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WATER TREATMENT REPLACEMENT

URANIUM AND THORIUM ANALYTICAL ANALYSIS

SURFACE SAMPLES (0" TO 6")

SAMPLE	TOTAL U (pCi/g)	TOTAL Th (pCi/g)	U (WT%)	TH 228 (pCi/g)	TH 230 (pCi/g)	TH 232 (pCi/g)
1	13	3.4	U233 0.002 U234 0.006 U235 0.56 U236 0.011 U238 99.43	1.0	1.5	0.91
2	40	3.3	U233 <0.001 U234 0.007 U235 0.62 U236 0.009 U238 99.36	0.95	1.7	0.62
3	13	2.3	U233 <0.001 U234 0.005 U235 0.68 U236 0.004 U238 99.32	0.38	1.3	0.65
4	6.8	2.3	U233 <0.001 U234 0.003 U235 0.62 U236 0.12 U238 99.36	0.70	1.1	0.57
5	9.1	3.1	U233 <0.001 U234 0.004 U235 0.69 U236 0.008 U238 99.30	0.67	1.6	0.82
6	13	3.4	U233 <0.001 U234 0.005 U235 0.68 U236 0.032 U238 99.28	0.92	1.8	0.67
7	5.2	2.7	U233 <0.001 U234 0.002 U235 0.67 U236 0.006 U238 99.33	0.72	1.2	0.84

TABLE 1

WATER TREATMENT REPLACEMENT

URANIUM AND THORIUM ANALYTICAL ANALYSIS

SURFACE SAMPLES (0" TO 6")
(cont.)

SAMPLE	TOTAL U (pCi/g)	TOTAL Th (pCi/g)	U (WT%)	TH 228 (pCi/g)	TH 230 (pCi/g)	TH 232 (pCi/g)
8	6.0	2.9	U233 <0.001 U234 0.003 U235 0.59 U236 0.007 U238 99.40	0.87	1.3	0.68
9	20	5.6	U233 <0.001 U234 0.004 U235 0.71 U236 0.005 U238 99.28	1.0	3.4	1.2
10	16	3.2	U233 <0.001 U234 0.002 U235 0.67 U236 0.006 U238 99.32	0.97	1.5	0.68
11	21	3.8	U233 <0.001 U234 0.002 U235 0.69 U236 0.006 U238 99.30	0.88	2.2	0.71
12	6.8	2.6	U233 <0.001 U234 0.004 U235 0.69 U236 0.007 U238 99.30	0.94	1.3	0.38
12c	7.8	2.3	U233 0.001 U234 0.006 U235 0.70 U236 0.008 U238 99.29	1.2	0.73	0.41
13	5.5	3.1	U233 <0.001 U234 0.002 U235 0.70 U236 0.005 U238 99.29	0.79	1.5	0.79

TABLE 1

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WATER TREATMENT REPLACEMENT

URANIUM AND THORIUM ANALYTICAL ANALYSIS

SURFACE SAMPLES (0" TO 6")
(cont.)

SAMPLE	TOTAL U (pCi/g)	TOTAL Th (pCi/g)	U (WT%)	TH 228 (pCi/g)	TH 230 (pCi/g)	TH 232 (pCi/g)
13c	7.8	2.4	U233 <0.001 U234 0.006 U235 0.71 U236 0.003 U238 99.28	1.2	0.82	0.41

TABLE 1A

WATER TREATMENT REPLACEMENT

URANIUM AND THORIUM ANALYTICAL ANALYSIS

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SURFACE SAMPLES (6" TO 1'-0")

SAMPLE NUMBER	TOTAL U (pCi/g)	TOTAL Th (pCi/g)
1-1	19	<4
2-1	23	<4
3-1	9	<4
4-1	20	<4
5-1	10	<4
6-1	11	<4
7-1	7	<4
8-1	11	<4
9-1	11	<4
10-1	16	<4
11-1	14	<4
12-1	7	<4
13-1	7	<4
	SAMPLES AT 2'-0"	
1-2	26	<4
2-2	15	<4
3-2	7	<4
4-2	11	<4
5-2	10	<4
6-2	<8	<4
7-2	<8	<4
8-2	<8	<4
9-2	<8	<4
10-2	<8	<4
11-2	11	<4
12-2	<8	<4
13-2	<8	<4
	SAMPLES AT 3'-0"	
1-3	<8	<4
2-3	<8	<4
3-3	<8	<4
4-3	<8	<4
5-3	<8	<4
6-3	<8	<4
7-3	<8	<4
8-3	<8	<4
9-3	<8	<4
10-3	<8	<4
11-3	<8	<4
12-3	<8	<4
13-3	<8	<4

TABLE 2

WATER TREATMENT REPLACEMENT

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TCLP METAL ANALYSIS

SAMPLE NO.	AS m/gl	BA m/gl	Cd m/gl	Cr m/gl	Pb m/gl	Hg m/gl	Se m/gl	Ag m/gl
1	ND	ND	ND	ND	ND	ND	ND	ND
2	ND	ND	ND	ND	ND	ND	ND	ND
3	ND	.309	ND	ND	ND	ND	ND	ND
4	ND	.595	ND	ND	ND	ND	ND	ND
5	ND	.744	ND	ND	ND	ND	ND	ND
6	ND	.500	ND	ND	ND	ND	ND	ND
7	ND	.701	ND	ND	ND	ND	ND	ND
8	ND	.688	ND	ND	ND	ND	ND	ND
9	ND	.758	ND	ND	ND	ND	ND	ND
10	ND	.487	ND	ND	ND	ND	ND	ND
11	ND	.481	ND	ND	ND	ND	ND	ND
12	ND	.284	ND	ND	ND	ND	ND	ND
12c	ND	1.257	ND	ND	ND	ND	ND	ND
13	ND	1.099	ND	ND	ND	ND	ND	ND
13c	ND	.508	ND	ND	ND	ND	ND	ND

TCLP PESTICIDES ANALYSIS

PARAMETER	DETECTION LIMIT	CONC. (ug/l)	REGULATORY LEVEL (ug/l)
CHLORDANE	0.10	ND	30
HEPTACHLOR EPOXIDE	0.05	ND	8
METHOXYCHLOR	0.50	ND	10000
ENDRIN	0.10	ND	20
LINDANE	0.05	ND	400
TOXAPHENE	1.00	ND	500

TCLP HERBICIDES ANALYSIS

PARAMETER	DETECTION LIMIT	CONC. (ug/l)	REGULATORY LEVEL (ug/l)
2,4-D	1.00	ND	10000
SILVEX (2,4,5-TP)	0.50	ND	1000

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*Pesticides/Herbicides were non-detectable at each of the thirteen sample points.